Introduction to Macroeconomics

Solow-Swan Steady State Growth Model

Introduction

The Solow-Swan growth model is a dynamic model that shows the growth of capital and output per worker. It has two major outcomes. Firstly the model predicts that countries will always end up at a long run steady state of growth where the economy is growing at a constant rate. Secondly the model says that the economic growth between countries should converge. Furthermore the model predicts that as the population grows output per worker falls and as saving increases output per worker rises. Also the model says that the only way long run growth can be maintained is through increases in total factor productivity. It is important to note that an increase in saving will increase growth in the short run but eventually the growth rate will return to its long run level. Additionally at the long run steady state the economy is still growing but at a constant or steady rate.

We can show the effects of an increase in saving, population and TFP by using the steady state model in the following diagrams.

1. An increase in population

A increase in population (n) will increase the slope of the line (n+d)k and will therefore reduce the rate of growth in the short run. Then eventually the rate of growth returns to its long run steady state equilibrium at K**. Basically more population for a given capital stock will reduce capital per worker and this is reflected in the diagram by the decrease in the steady state level from K* to K**. Due to less capital per worker we will also see a reduction in output per worker when population increases.

2. A decrease in population

A decrease in population will have the reverse effect to an increase in population. Now we will have more capital per worker making each worker more productive. Therefore we will also see a higher output per worker when we see a population decrease. Again there will be short run change in the growth rate but in the long run the capital, output and savings per worker will grow at the same rate.
3. An increase in Savings

An increase in savings will initially increase the rate of growth in the short run but then it will return to the steady state growth rate in the long run. Before and after an increase in savings output, capital and savings per worker will grow at the same rate as the population growth rate. All variables grow by (n) in the long run.

4. A decrease in savings

If there is a decrease in savings then the outcome will be a decrease in the steady state growth of capital and output per person. In the short run the growth rate will change temporarily until the long run steady state point is reached where capital, output and savings per person all grow by the same rate which is the rate of population growth.
5. An increase in TFP

An increase in total factor productivity will cause an increase in output per capita. Total factor productivity includes anything that the conventional factors of production exclude. TFP is mainly categorized as technological improvements but it could come from a number of sources. For instance, favourable weather in agricultural sectors could be called TFP. TFP is assumed to be exogenous and therefore has the ability to keep rising indefinitely. Therefore TFP shocks are a prime candidate for explaining the business cycle. As illustrated the growth rate does not have to slow down to a steady state level but can keep growing constantly.
6. A decrease in TFP

A decrease in TFP could also come from a variety of sources outside the traditional factors of production. For instance a hurricane or natural disaster could wipe out some industrial factories and destroy hard capital in the process.